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Systems Approach for Riparian Management

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Tamarisk management is a growing issue for millions of acres of infested land across the American West. Tamarisk have no natural enemies in the United States, and are swiftly replacing native vegetation thus degrading livestock/wildlife habitat, increasing wildfire intensity, decreasing recreational activities, and most notably, competing for limited water supplies.

There are no simple answers on how best to manage tamarisk population. Decisions are complicated by the complex riparian systems that the tamarisk live and the contentious social context in which planning is conducted. For example, tamarisk have been successful in replacing native vegetation, so they now provide important value in stabilizing the banks of Western rivers prone to avulsion and erosion as well as endangered species habitat (although considered poor-is better than no habitat). Destroying these trees without rational planning may induce severe, costly erosion and displace endangered species.

As such, efficient management defies myopic, piecemeal approaches driven by political whim. Rather, planning benefits from the fusion of knowledge and experience widely distributed across physical and social scientists, engineers, resource managers, decision-makers, stakeholders, and the general public. Ideally, an environment is established that promotes shared learning leading to cooperative and adaptive management. Success requires a process for inclusive and transparent sharing of ideas complimented by tools to structure, quantify, and visualize the collective understanding and data, providing an informed basis of dialogue and exploration. System dynamics provides a unique mathematical framework for integrating the physical and social processes important to resource management, and for providing an interactive environment for engaging the public. System dynamics models are predicated on the classical formalisms of physical and social science; albeit, at reduced spatial and temporal resolution. This tradeoff in resolution and thus computational burden, allows real-time analysis over an extended decision space.

Our objective is to ease resource related conflict through the application of computer-aided dispute resolution methods. We promote the use of decision-support technologies within a collaborative process to help stakeholders find common ground and create mutually beneficial resource management solutions. Such decision support models implemented within a dispute resolution context have been developed and applied in a number of river basins within the United States (Middle Rio Grande, Gila, Mimbres, and Willamette) and are actively being extended to water resource issues in Jordan. Such models have been used in sustainable water use planning; exploration of water use efficiencies in irrigated agriculture; cost-benefits analysis for alternative water conservation strategies; assessing tradeoffs in water allocations between irrigated agriculture, instream water use, and urban development; design of water markets; and, trans-boundary water resource planning. A key element in many of these efforts is the role of tamarisk management within the broader context of water planning.

In this presentation we will provide a basic overview of our computer-aided dispute resolution approach. Application will be drawn to several different projects for which decision support models will be demonstrated and results presented. Emphasis will be placed on projects involving tamarisk management.

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